

WHAT IS CLAIMED IS:

1. A surface-processing apparatus for a printed wiring board comprising:

means for etching the surface of a conductor pattern formed on at least one surface of a printed wiring board;

first rinsing means for rinsing the surface of the printed wiring board the conductor pattern of which has been etched by said etching means;

air bubble removing means for removing air bubbles affixed to the surface of the printed wiring board by immersing the printed wiring board rinsed by said first rinsing means in a water-soluble pre-flux liquid in a processing vessel;

pre-flux forming means for forming a pre-flux film on said conductor pattern on said printed wiring board in the pre-flux liquid, freed of air bubbles by said air bubble removing means, using an in-liquid spray provided in said pre-flux liquid in said processing vessel;

liquid removing means for removing the pre-flux liquid from the surface of said printed wiring board carrying said pre-flux film; and

second rinsing means for rinsing the surface of said printed wiring board from the surface of which said pre-flux liquid has been removed by said liquid removing means.

2. The surface-processing apparatus for a printed wiring board according to claim 1 wherein said etching means removes the surface of said conductor pattern by 1.5 to 2.5 μm .

3. The surface-processing apparatus for a printed wiring board according to claim 1 wherein said first rinsing means rinses the surface of the printed wiring board, the conductor pattern of which has been etched, with acid, then rinses the acid-rinsed surface with water under a condition of not less than 0.5 MPa/cm^2 and subsequently rinses the water-washed surface with water under a condition of not less than $5 \text{ lit/cm}^2 \cdot \text{min}$.
4. The surface-processing apparatus for a printed wiring board according to claim 3 wherein said water washing is with pure water not lower than 35°C .
5. The surface-processing apparatus for a printed wiring board according to claim 1 wherein said pre-flux film is mainly composed of an imidazole compound and is formed to a thickness of 0.2 to 0.3μ on said conductor pattern.
6. The surface-processing apparatus for a printed wiring board according to claim 1 wherein said air bubble removing means is a sponge-like roll.
7. The surface-processing apparatus for a printed wiring board according to claim 1 wherein said pre-flux forming means transfers said printed wiring board using upper and lower paired rolls provided at a spacing from each other larger than the thickness of the printed wiring board.
8. The surface-processing apparatus for a printed wiring board according to claim 1 wherein said liquid removing means includes a sponge-like roll and a lower saucer in which said pre-flux liquid is stored in circulation.
9. A surface-processing method for a printed wiring board comprising the steps of:

etching the surface of a conductor pattern formed on at least one surface of a printed wiring board;

rinsing the surface of the printed wiring board the conductor pattern of which has been etched by said etching step;

removing air bubbles affixed to the surface of the printed wiring board by immersing the printed wiring board rinsed by said first rinsing step in a water-soluble pre-flux liquid in a processing vessel;

forming a pre-flux film on said conductor pattern on said printed wiring board in the pre-flux liquid, freed of air bubbles, using an in-liquid spray provided in said pre-flux liquid in said processing vessel;

removing the pre-flux liquid from the surface of said printed wiring board carrying said pre-flux film and transferred from said processing vessel; and

rinsing the surface of said printed wiring board from the surface of which said pre-flux liquid has been removed by said liquid removing step.

10. The surface-processing method for a printed wiring board according to claim 9 wherein said etching step removes the surface of said conductor pattern by 1.5 to 2.5 μm .

11. The surface-processing method for a printed wiring board according to claim 9 wherein said first rinsing step rinses the surface of the printed wiring board, the conductor pattern of which has been etched, with acid, then rinses the acid-rinsed surface with water under a condition of not less than 0.5 MPa/cm² and subsequently

rinses the water-washed surface with water under a condition of not less than 5 lit/cm²·min.

12. The surface-processing method for a printed wiring board according to claim 11 wherein said water washing is with pure water not lower than 35°C.

13. The surface-processing method for a printed wiring board according to claim 9 wherein said pre-flux film is mainly composed of an imidazole compound and is formed to a thickness of 0.2 to 0.3 μm on said conductor pattern.

14. The surface-processing method for a printed wiring board according to claim 9 wherein said air bubble removing step uses a sponge-like roll.

15. The surface-processing method for a printed wiring board according to claim 9 wherein said pre-flux forming step transfers said printed wiring board using upper and lower paired rolls provided at a spacing from each other larger than the thickness of the printed wiring board.

16. The surface-processing method for a printed wiring board according to claim 9 wherein said liquid removing step includes a sponge-like roll and a lower saucer in which said pre-flux liquid is stored in circulation.